Assignment-3

Question 1. Given an array of N size, Print the Next Greater Element of every element.

The Next Great Element for an element x is the first greater element on the right side of x in the array. Elements for which no greater element exist, consider the next greater element as -1

Input Format: Given array of N size with space separated integers.

Output: Array of size N with next greater element.

Input 1: 4 5 2 25

Output 1: 5 25 25 -1

Input 2: 5 7 1 7 6 0

Output 2: 7 -1 7 -1 -1 -1

Question 2. Given an array of random numbers, Push all the zero's of a given an array to the end of the array. All non-zero elements should come in front and Order of all non-zero elements should be same.

Input Format: Given an array of random numbers.

Output Format: Move all zeros to end of array and keeping all non-zero element in same position.

Input 1: 1 2 0 4 3 0 5 0

Output 1: 1 2 4 3 5 0 0 0

Input 1: 1 2 0 0 0 3 6

Question 3. A list of integers nums (1<=len(num)<=10^5) representing an array of numbers. Return the maximum sum of any contiguous subarray in the given array.

Example:

Input : -2 1 -3 4 -1 2 1 -5 4

Output: 6

Input : 3 -1 2 5 -6 3

Output: 9

Question 4: Nearest Integer

Int nearestInteger(int num, int m)

The function accepts two positive 'num' and 'm' as its argument, Implement the following function to find the nearest integer to num.

1) Number is divisible by m.
2) Number is nearest to 'num' (Have the least distance from num)

Note: If there are two numbers with the least distance from num, then return the larger num.

Input 1: Num= 67

M = 8

Output 1: 64

Input 2: Num=26

M=3

Output 2: 27

Question 5. Unique Path

Unique Paths states that given the m*n grid where a robot starts from the top left corner of the grid. We need to find the total number of ways to reach the bottom right corner of the grid the robot can only move either down or right at any point in time.

There are some cells containing Obstacles which are represented by 1 while 0 for a free call.

Input 1:

0	0	0
0	1	0
0	0	0

Output 1: 2

Input 2:

0	**1**
0	**0**

Output 2: 1

Question 6

Alice has to climb N stairs to reach top. In each step Alice can climb either 1 step or M steps, Find the minimum numbers of steps to reach the top.

Input Format: Input contains two space separated integer N and M. required

Output Format: Contains integer, that represents minimum number of climbs

Constraints:

1<=N<=10^9

1<=M<=10^9

Input 1: 5 2

Output : 1

Question 7. Given an array of length n, find the length of largest subarray which contains equal number of 0s and 1s

Input 1-> 1 0 1 1 1 0 0

Output 1-> 6

Input 2: 0 0 1 1 0

Output: 4
to reach top.

Question 8. You are given a program to find count of magical numbers from 1 to N. A magical Number is defined by Following Criteria

1. Replace 0 with 1 and 1 with 2 in binary string
2. Calculate the sum of digits of modified binary string, if sum is odd it means its magical number.

Input 1: 5

Output 1: 2

Explanation:

1->1->2->even

2->10->21->odd

3->11->22->even

Question 9. Reverse a Number

Num= 987654

Output= 456789

Question 10. Find the largest number in an array

Int arr[]= {1,4,6,7,8,9}

Output: 9

Question 11. Given an integer array nums, find the subarray with the largest sum, and return its sum.

Input: Nums= {-2,1,-3,4,-1,2,1,-5,4}

Output: 6

Question 12. Write a code for Prime Number.

Prime number is a number that is greater than 1 and divided by 1 or itself only.

Question 13. Find the target element in an array.

int [] array = {2,3,4,10,40};

int target = 10;

Question 14. Find the middle of linkedlist

Question 15. Given head, the head of a linked list, determine if the linked list has a cycle in it.

Ques 16. Given two strings s and t, return true if t is an anagram of s, and false otherwise.

An anagram is a word or phrase formed by rearranging the letters of a different word or phrase, typically using all the original letters exactly once.

Input: s=”anagram”, t=”nagaram”

Output: true

Question 17. Find the missing number in an array.

Given an array nums containing n distinct numbers in the range [0,n], return the only number in the range that is missing from the array.

Input: Nums = [3,0,1]

Output: 2

Question 18. Check whether string is palindrome or not.

Input :- String str= “Hello, World!”

Question 20. Count the occurrences of a given element in an array.

int [] arr ={5,2,4,1,2}

int element = 2;

Question 21. Calculate and return the difference between the sum of square roots of even numbers and the sum of square roots of odd numbers in the range from ‘m’ to ‘n’ (inclusive)

Input: int m = 1, n=10

Question 22. Search a 2D Matrix (Leetcode)

Question 19. The function accepts a string ‘str’ as its argument. The function needs to reverse the order of the words in the string.

Question 23. Check if two strings Arrays are Equivalent Input

: word1: [“ab”, “c”] , word2=[“a”, “bc”]

Output: true (because ultimately the strings are “abc”)

Question 24. Inorder traversal and preorder Traversal code

Question 25. Best Time to Buy and Sell Stock

You want to maximize your profit by choosing a single day to buy one stock and choosing a different day in the future to sell that stock

Input: Prices =[7,1,5,3,6,4]

Output: 5

Question 26. Fibonacci

Question 27. Factorial

Question 28. Given an array, we have to found the number of occurrences of each element in the array.

Input: arr[] = {10,5,10,15,10,5};

Output:

10 : 3

5: 2

15: 2

Question 29. Rearrange array element by sign

You are given a 0-indexed integer array nums of even length consisting of an equal number of positive and negative integers**.**

Input: nums= [3,1,-2,-5,2,-4]

Output: [3,-2,1,-5,2,-4]

Ques 30.

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In an array , a superior element is one which is greater than all the elements to its right side.
The rightmost element itself be a superior element.

You are given a function,
int Find_Number_Of_Superior_Element(int arr[], int n);

The function accepts an integer array and the size of array, Implement the function
to find the total number of superior elements present in array.

Assumptions:
N>0 and Array index starts from 0

Input : n=  6
      arr=  [8,10,6,2,9,7]
Output: 3
```

Ques 31.

Problem statement

It is Edward's birthday today. His friends have bought him a huge circular cake.
Edward wants to find out the maximum number of pieces he can get by making exactly N straight vertical cuts on the cake.
Your task is to write a function that returns the maximum number of pieces that can be obtained by making N number of cuts.

Note: Since the answer can be quite large, modulo it by 1000000007

Input Specification:
input1: An integer N denoting the number of cuts

Output Specification:
Return the maximum number of pieces that can be obtained by making N cuts on the cake

Ques 32

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(18 Sept 2023)
Given a number N your Task is to make N a single digit number by performing these operations

1) If N is odd , make it floor(N/2)
2) If N is even, make it floor((N-2)/2)
3) If N is already a single digit , print as it is

Example:
Input 1: N=25
Output 1: 12

Input 2: N=10
Output: 4

Input 3: N=5
Output: 5
```


Ques 33.

1. **Problem Description**:

The Binary number system only uses two digits, 0 and 1 and the number system can be called binary string. You are required to implement the following function:
int OperationsBinaryString(char* str);
The function accepts a string str as its argument. The string str consists of binary digits separated with an alphabet as follows:
– A denotes AND operation
– B denotes OR operation
– C denotes XOR Operation

You are required to calculate the result of the string str, scanning the string to right taking one operation at a time, and return the same.

Note: No order of priorities of operations is required.
Length of str is odd.
If str is NULL or None (in case of Python), return -1.

Input:
1C0C1C1A0B1

Output:
1

Ques 34.

The function accepts two positive integers 'r' and 'unit' and a positive integer array 'arr' of size 'n' as its argument 'r' represents the number of rats present in an area,
'unit' is the amount of food each rat consumes and each ith element of array 'arr' represents the amount of food present in 'i+1' house number, where 0 <= i.

Note:
Return -1 if the array is null.
Return 0 if the total amount of food from all houses is not sufficient for all the rats.
Computed values lie within the integer range.

Example:
Input:
r: 7
unit: 2
n: 8
arr: 2 8 3 5 7 4 1 2

Output:
4

Explanation:
Total amount of food required for all rats = r * unit
= 7 * 2 = 14.
The amount of food in 1st houses = 2+8+3+5 = 18. Since, the amount of food in 1st 4 houses is sufficient for all the rats. Thus, output is 4.

Ques. 35

You are given a function,
int findCount(int arr[], int length, int num, int diff);
The function accepts an integer array 'arr', its length and two integer variables 'num' and 'diff'.
Implement this function to find and return the number of elements of 'arr' having an absolute difference of less than or equal to 'diff' with 'num'.

Note: In case there is no element in 'arr' whose absolute difference with 'num' is less than or equal to 'diff', return -1.

Example:
Input:
arr: 12 3 14 56 77 13
num: 13
diff: 2

Output:
3

Explanation:
Elements of 'arr' having absolute difference of less than or equal to 'diff' i.e. 2 with 'num' i.e. 13 are 12, 13 and 14.

Ques 36.

Implement the following Function
def ProductSmallestPair(sum, arr)
The function accepts an integer sum and an integer array arr of size n.
Implement the function to find the pair, (arr[j], arr[k]) where j!=k,such that arr[j] and arr[k] are the least two elements of array (arr[j] + arr[k] <= sum) and return the product of element of this pair.

Note:
Return -1 if array is empty or if n < 2
Return 0, if no such pairs found.
All computed values lie within integer range.

Example:
Input
sum:9
Arr:5 2 4 3 9 7 1

Output
2

Explanation:
Pair of least two element is (2, 1) 2 + 1 = 3 < 9, Product of (2, 1) 2*1 = 2. Thus, output is 2.

A carry is a digit that is transferred to left if sum of digits exceeds 9 while adding two numbers from right-to-left one digit at a time.
You are required to implement the following function.
Int NumberOfCarries(int num1 , int num2);

The function accepts two numbers 'num1' and 'num2' as its arguments. You are required to calculate and return the total number of carries generated while adding digits of two numbers 'num1' and ' num2'.

Assumption: num1, num2>=0

Example:
Input
Num 1: 451
Num 2: 349

Output
2

Explanation:
Adding 'num 1' and 'num 2' right-to-left results in 2 carries since (1+9) is 10. 1 is carried and (5+4=1) is 10, again 1 is carried. Hence 2 is returned.

You are given a function,
void *ReplaceCharacter(Char str[], int n, char ch1, char ch2);

The function accepts a string ' str' of length n and two characters 'ch1' and 'ch2' as its argument.
Implement the function to modify and return the string ' str' in such a way that all occurrences of 'ch1' in the original string are replaced by 'ch2' and all occurrences of 'ch2' in the original string are replaced by 'ch1'.

Assumption: String Contains only lower-case alphabetical letters.

Note:
Return null if the string is null.
If both characters are not present in the string or both of them are the same , then return the string unchanged.

Example:
Input:
Str: apples
ch1:a
ch2:p

Output:
paales

accenture